

# PCT

## FEE CALCULATION SHEET Annex to the Request

For receiving Office use only

International application No.

Date stamp of the receiving Office

Applicant's or agent's  
file reference

AF-43886

Applicant

Ayrshire Metal Products plc et al

### CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE . . . . . 55 T

2. SEARCH FEE . . . . . 812 S

International search to be carried out by  
(If two or more International Searching Authorities are competent in relation to the international application, indicate the name of the Authority which is chosen to carry out the international search.)

3. INTERNATIONAL FEE

#### Basic Fee

The international application contains 23 sheets.

first 30 sheets . . . . . 285 b1

\_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_ b2

remaining sheets additional amount

Add amounts entered at b1 and b2 and enter total at B . . . . . 285 B

#### Designation Fees

The international application contains A11 designations. 650

\_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_ D

number of designation fees amount of designation fee payable (maximum 10)

Add amounts entered at B and D and enter total at I . . . . . 935 I

(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the sum of the amounts entered at B and D.)

4. FEE FOR PRIORITY DOCUMENT (if applicable) . . . . . 22 P

5. TOTAL FEES PAYABLE . . . . . 1824

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

TOTAL

☐ The designation fees are not paid at this time.

### MODE OF PAYMENT

☐ authorization to charge deposit account (see below)

☐ bank draft

☐ coupons

☒ cheque

☐ cash

☐ other (specify):

☐ postal money order

☐ revenue stamps

### DEPOSIT ACCOUNT AUTHORIZATION (this mode of payment may not be available at all receiving Offices)

The RO/ \_\_\_\_\_ ☐ is hereby authorized to charge the total fees indicated above to my deposit account.

☐ (this check-box may be marked only if the conditions for deposit accounts of the receiving Office so permit) is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.

☐ is hereby authorized to charge the fee for preparation and transmittal of the priority document to the International Bureau of WIPO to my deposit account.

## PATENT COOPERATION TREATY

3

PCT

A. FINDLAY

From the INTERNATIONAL BUREAU

NOTIFICATION CONCERNING  
SUBMISSION OR TRANSMITTAL  
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

FINDLAY, Alice, Rosemary  
Lloyd Wise, Tregear & Co  
Commonwealth House  
1-19 New Oxford Street  
London WC1A 1LW  
ROYAUME-UNI

Date of mailing (day/month/year) 15 April 1999 (15.04.99)	
Applicant's or agent's file reference AF-43886	IMPORTANT NOTIFICATION
International application No. PCT/GB99/00393	International filing date (day/month/year) 08 February 1999 (08.02.99)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 09 February 1998 (09.02.98)
Applicant AYRSHIRE METAL PRODUCTS PLC et al	

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
3. An asterisk(\*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
4. The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
09 Febr 1998 (09.02.98)	9802753.5	GB	14 Apri 1999 (14.04.99)

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

Maria Victoria CORTIELLO

Telephone No. (41-22) 338.83.38



Application No: GB 9802753.5  
Claims searched: 1-18

Examiner: Mr D. J. Lovell  
Date of search: 24 March 1998

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): E1D ( DCJ, DGS )

Int Cl (Ed.6): E04B

Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X,Y	GB 1470161 Alam	(X)1,2,4,5 (Y)13
Y	WO 96/41923 A1 American Containment Systems	13
X	US 4514950 Goodson	1,2,4
Y	US 4073101 Yoshida	13

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.

# PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only	
International Application No.	
International Filing Date	
Name of receiving Office and "PCT International Application"	
Applicant's or agent's file reference (if desired) (12 characters maximum)	AF-43886

<b>Box No. I TITLE OF INVENTION</b>	
MODULAR BUILDING UNIT	
<b>Box No. II APPLICANT</b>	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)	
Ayrshire Metal Products plc Irvine Ayrshire KA12 8PH Scotland	
<input type="checkbox"/> This person is also inventor. Telephone No. Facsimile No. Teleprinter No.	
State (that is, country) of nationality: Great Britain	State (that is, country) of residence: Great Britain
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input checked="" type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
<b>Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)</b>	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)	
Robert J COLVER 27 Park Road Barton-Under-Needwood Staffordshire DE13 8DW	
This person is: <input type="checkbox"/> applicant only <input checked="" type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)	
State (that is, country) of nationality:	State (that is, country) of residence:
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
<input type="checkbox"/> Further applicants and/or (further) inventors are indicated on a continuation sheet.	
<b>Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE</b>	
The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: <input type="checkbox"/> agent <input type="checkbox"/> common representative	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)	
Alice Rosemary FINDLAY et al LLOYD WISE, TREGAR & CO Commonwealth House 1-19 New Oxford Street London WC1A 1LW	
Telephone No. 0171 571 6200 Facsimile No. 0171 571 6250 Teleprinter No. 267675	
<input type="checkbox"/> Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.	

## Box No.V DESIGNATING STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

## Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line) .....

## National Patent (if other kind of protection or treatment desired, specify on dotted line):

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> AL Albania .....                               | <input checked="" type="checkbox"/> LS Lesotho .....                                   |
| <input checked="" type="checkbox"/> AM Armenia .....                               | <input checked="" type="checkbox"/> LT Lithuania .....                                 |
| <input checked="" type="checkbox"/> AT Austria .....                               | <input checked="" type="checkbox"/> LU Luxembourg .....                                |
| <input checked="" type="checkbox"/> AU Australia .....                             | <input checked="" type="checkbox"/> LV Latvia .....                                    |
| <input checked="" type="checkbox"/> AZ Azerbaijan .....                            | <input checked="" type="checkbox"/> MD Republic of Moldova .....                       |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina .....                | <input checked="" type="checkbox"/> MG Madagascar .....                                |
| <input checked="" type="checkbox"/> BB Barbados .....                              | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia ..... |
| <input checked="" type="checkbox"/> BG Bulgaria .....                              | <input checked="" type="checkbox"/> MN Mongolia .....                                  |
| <input checked="" type="checkbox"/> BR Brazil .....                                | <input checked="" type="checkbox"/> MW Malawi .....                                    |
| <input checked="" type="checkbox"/> BY Belarus .....                               | <input checked="" type="checkbox"/> MX Mexico .....                                    |
| <input checked="" type="checkbox"/> CA Canada .....                                | <input checked="" type="checkbox"/> NO Norway .....                                    |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein .....  | <input checked="" type="checkbox"/> NZ New Zealand .....                               |
| <input checked="" type="checkbox"/> CN China .....                                 | <input checked="" type="checkbox"/> PL Poland .....                                    |
| <input checked="" type="checkbox"/> CU Cuba .....                                  | <input checked="" type="checkbox"/> PT Portugal .....                                  |
| <input checked="" type="checkbox"/> CZ Czech Republic .....                        | <input checked="" type="checkbox"/> RO Romania .....                                   |
| <input checked="" type="checkbox"/> DE Germany .....                               | <input checked="" type="checkbox"/> RU Russian Federation .....                        |
| <input checked="" type="checkbox"/> DK Denmark .....                               | <input checked="" type="checkbox"/> SD Sudan .....                                     |
| <input checked="" type="checkbox"/> EE Estonia .....                               | <input checked="" type="checkbox"/> SE Sweden .....                                    |
| <input checked="" type="checkbox"/> ES Spain .....                                 | <input checked="" type="checkbox"/> SG Singapore .....                                 |
| <input checked="" type="checkbox"/> FI Finland .....                               | <input checked="" type="checkbox"/> SI Slovenia .....                                  |
| <input checked="" type="checkbox"/> GB United Kingdom .....                        | <input checked="" type="checkbox"/> SK Slovakia .....                                  |
| <input checked="" type="checkbox"/> GD Grenada .....                               | <input checked="" type="checkbox"/> SL Sierra Leone .....                              |
| <input checked="" type="checkbox"/> GE Georgia .....                               | <input checked="" type="checkbox"/> TJ Tajikistan .....                                |
| <input checked="" type="checkbox"/> GH Ghana .....                                 | <input checked="" type="checkbox"/> TM Turkmenistan .....                              |
| <input checked="" type="checkbox"/> GM Gambia .....                                | <input checked="" type="checkbox"/> TR Turkey .....                                    |
| <input checked="" type="checkbox"/> HR Croatia .....                               | <input checked="" type="checkbox"/> TT Trinidad and Tobago .....                       |
| <input checked="" type="checkbox"/> HU Hungary .....                               | <input checked="" type="checkbox"/> UA Ukraine .....                                   |
| <input checked="" type="checkbox"/> ID Indonesia .....                             | <input checked="" type="checkbox"/> UG Uganda .....                                    |
| <input checked="" type="checkbox"/> IL Israel .....                                | <input checked="" type="checkbox"/> US United States of America .....                  |
| <input checked="" type="checkbox"/> IN India .....                                 | <input checked="" type="checkbox"/> UZ Uzbekistan .....                                |
| <input checked="" type="checkbox"/> IS Iceland .....                               | <input checked="" type="checkbox"/> VN Viet Nam .....                                  |
| <input checked="" type="checkbox"/> JP Japan .....                                 | <input checked="" type="checkbox"/> YU Yugoslavia .....                                |
| <input checked="" type="checkbox"/> KE Kenya .....                                 | <input checked="" type="checkbox"/> ZW Zimbabwe .....                                  |
| <input checked="" type="checkbox"/> KG Kyrgyzstan .....                            |  |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea ..... |  |
| <input checked="" type="checkbox"/> KR Republic of Korea .....                     |  |
| <input checked="" type="checkbox"/> KZ Kazakhstan .....                            |  |
| <input checked="" type="checkbox"/> LC Saint Lucia .....                           |  |
| <input checked="" type="checkbox"/> LK Sri Lanka .....                             |  |
| <input checked="" type="checkbox"/> LR Liberia .....                               |  |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- ☐ .....
- ☐ .....
- ☐ .....

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

<b>Box No. VI PRIORITY</b>		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: regional Office	international application: receiving Office
item (1)  09/02/1998	9802753.5	GB		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

**Box No. VII INTERNATIONAL SEARCHING AUTHORITY**

<b>Choice of International Searching Authority (ISA)</b> (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen: the two-letter code may be used):  ISA /	<b>Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):</b>  Date (day/month/year)      Number      Country (or regional Office)
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**Box No. VIII CHECK LIST; LANGUAGE OF FILING**

This international application contains the following number of sheets: request : 3 description (excluding sequence listing part) : 12 claims : 3 abstract : 1 drawings : 4 sequence listing part of description : Total number of sheets : 23	This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify):
---	--

<b>Figure of the drawings which should accompany the abstract:</b> 1	<b>Language of filing of the international application:</b>
--	---

**Box No. IX SIGNATURE OF APPLICANT OR AGENT**

*Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).*

ALICE ROSEMARY FINDLAY

For receiving Office use only	
1. Date of actual receipt of the purported international application:	2. Drawings:  <input type="checkbox"/> received:  <input type="checkbox"/> not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority (if two or more are competent): ISA /	
6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.	

For International Bureau use only	
Date of receipt of the record copy by the International Bureau:	

# PATENT COOPERATION TREATY

**PCT**

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C.20231  
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

**Date of mailing (day/month/year)**  
29 September 1999 (29.09.99)

**International application No.**  
PCT/GB99/00393

**Applicant's or agent's file reference**  
AF-43886

**International filing date (day/month/year)**  
08 February 1999 (08.02.99)

**Priority date (day/month/year)**  
09 February 1998 (09.02.98)

**Applicant**

COLVER, Robert, John

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
09 September 1999 (09.09.99)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

C. Carrié

Telephone No.: (41-22) 338.83.38

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>AF-43886</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 99/00393</b>	International filing date (day/month/year) <b>08/02/1999</b>	(Earliest) Priority Date (day/month/year) <b>09/02/1998</b>
Applicant <b>AYRSHIRE METAL PRODUCTS PLC et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

## 4. With regard to the title,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

## 5. With regard to the abstract,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

## 6. The figure of the drawings to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

1  
☐ None of the figures.



A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 E04B1/348

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 E04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 084 213 A (PORTAKABIN LTD) 7 April 1982 see the whole document ----	1,2,4-15
X	US 3 605 350 A (BOWERS WILLIAM STEWART) 20 September 1971 see the whole document ----	1,2,4-7, 10,11,13
A	DE 93 12 108 U (DSG SYSTEMBAU GMBH) 11 November 1993 see the whole document ----	1,2,6-8, 11-14
A	US 4 048 769 A (VAN DER LELY CORNELIS ET AL) 20 September 1977 see the whole document -----	12

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

3 May 1999

Date of mailing of the international search report

12/05/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Vrugt, S

Patent document cited in search report		Publication date	Patent family member	Publication date
GB 2084213	A	07-04-1982	NONE	
US 3605350	A	20-09-1971	NONE	
DE 9312108	U	11-11-1993	NONE	
US 4048769	A	20-09-1977	NL 7301828 A	13-08-1974
			AU 6508174 A	07-08-1975
			DE 2406004 A	15-08-1974
			FR 2217490 A	06-09-1974
			JP 49112421 A	26-10-1974

**Lloyd  
Wise**

Patent Designs Trade Marks  
London  
Manchester  
Hong Kong  
Singapore  
Beijing

09/601810 -  
Lloyd Wise, Tregear & Co

Commonwealth House  
110 New Oxford Street  
London  
WC1A 1LW

**532 Rec'd PCT/PTC 03 AUG 2000**

Telephone: +44 (0) 20 7571 6200  
Facsimile: +44 (0) 20 7571 6250  
E-mail: mail@lloydwise.co.uk  
Website: www.lloydwise.com

Chartered Patent Attorneys  
European Patent Attorneys  
Registered Trade Mark Attorneys  
European Trade Mark Attorneys

Our Ref: AF-43866 & 57209

3 March 2000

Mr R J Colver  
Ayrshire Metal Products plc  
Irvine  
Ayrshire KA12 8PH  
Scotland

Dear Bob,

re: International Patent Application No. PCT/GB99/00393  
and British Patent Application No. 9802753.5  
MODULAR BUILDING UNIT both in the name Ayrshire Metal Products plc

I refer to our meeting here at Commonwealth House on the 15th February 2000 and write to report that we have now responded to the outstanding Official Letters on these Applications as agreed then. A copy of the responses, together with a copy of the newly filed pages, is enclosed herewith.

The responses are somewhat different because we were dealing with different prior art. Furthermore, the European Patent Office require that claims include the reference numerals of the figures and that the independent claims be divided into two parts with those features which are known from the prior art in the first part.

I would note that, on reviewing the International Application again, I felt that we might as well leave the "panelised" method of construction since removal will not really make any difference at this stage, as the Examiner will primarily focus on the claims.

I put forward arguments against the prior art as discussed between us, in particular that this does not show runners which extend the full length of the framework nor corner members. I submitted that the difference in structure has the result of producing a different load distribution in practice and tried to emphasise the importance of the uniform load distribution which is achieved with the lattice framework of your module.

Hopefully, the respective Examiners will find these arguments convincing. If so, then the British Application should hopefully be in order for allowance. For the International case we

/Continued.....

Our Ref: AF-43866 & 57209

3 March 2000

Mr R J Colver  
Ayrshire Metal Products plc

/Cont'd...2

would then get a positive Report which will be circulated to the National Offices of the countries designated in that Application and that will put us in a good position if you do decide to proceed with National Applications in any of those countries.

We shall of course keep you informed as to the respective Examiner's reactions and meanwhile please do not hesitate to contact me if you have any queries.

Yours sincerely,

Alice Findlay  
for Lloyd Wise, Tregear & Co

enc  
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Our Ref: AF-43886

3 March 2000

European Patent Office  
Erhardtstrasse 27  
80331 Munchen  
Germany

Dear Sirs,

re: International Patent Application No. PCT/GB99/00393  
in the name Ayrshire Metal Products plc

We refer to the first Written Opinion dated the 25th January 2000 and enclose herewith in triplicate new pages 2 to 6, 6a and 7 to replace present pages 2 to 7 and a new set of claims to replace the set of claims presently on file.

In the Written Opinion the Examiner cited two documents: US Patent 3605350 and British Patent Application 2084213, hereinafter, respectively, D1 and D2.

D1 discloses a relocatable modular structure formed from a base frame and a roof frame which are interconnected and spaced by corner posts. The base frame and roof frame both comprise two spaced side beams. We can appreciate the Examiner's position that one of each pair of side beams, together with the corner posts to which they are attached, form together a rectangular frame member. However, to the extent that the modular structure of D1 has two rectangular frame members, these frame members are not spaced along the length of the module, rather they are spaced across its width.

The base frame and roof frame of the structure of D1 each include cross beams 16, 66. The walls of the structure also include wooden cross beams 84. However, to the extent that these cross beams can be considered as "runners", they do not extend transversely along the length of the module.

Still further, the structure of D1 is defined exteriorly by sheeting and not by the lattice framework. The lattice framework does not include corner members extending lengthwise across the framework and connected to the frame members at the corners thereof.

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Accordingly, new Claim 1 which includes these features defines subject matter which is novel in light of D1.

The structure of D1, with its roof frame and base frame connected by corner posts, is stated at column 1 lines 68 to 72 to have "an interior open-span, that is no interior load bearing walls". The structure is therefore specifically arranged to be of the type which is sometimes described as a "fish tank" where all the load is passed to the corner posts. No load is passed between the corner posts because the walls are not load bearing.

In contrast, with the lattice framework of the module as now defined in Claim 1, loads are uniformly distributed right through the framework and there is no load concentration points. The result of the uniform load distribution is that the framework can be made of comparatively thin sections whilst still having sufficient strength to perform the desired function,

There is nothing in D1 to suggest a module with a lattice framework arranged to provide for uniform load distribution. On the contrary the cited portion of column 1 makes it clear that the structure of D1 is specifically arranged to prevent uniform load distribution.

Therefore it is submitted that Claim 1 defines subject matter which is not only novel but also inventive in light of D1.

The same is true with respect to D2. The structure shown in D2 is somewhat similar to that of D1 in that it comprises a floor subframe and a roof subframe. These are connected together by vertical columns. The columns only link with the joists of the floor frame, since as stated at page 2 lines 126 to 129, the spacing of the joists in the roof subframe is different from that in the floor subframe "in that the distance between three joists in the roof frame is occupied by four joists in the floor frame".

Whilst the structure of D2 could again be considered as comprising two rectangular frame members, exactly as with the structure of D1, these rectangular frame members are not spaced along the length of the module but rather across its width. There are no runners extending transversely along the length of the module and there are no corner members.

The structure of D2 will again result in a load transfer which is different from that of the module of Claim 1. With the structure of D2 all the load will be transferred into the columns, that is, the arrangement will result in a series of point loads along its length. As noted above, with the framework of the module of Claim 1 on the other hand, loads are uniformly distributed right through the framework and there is no point load concentration.

It is therefore submitted that Claim 1 defines subject matter which is also novel and inventive in light of D2.

Turning to new Claim 10, which replaces Claim 13, the Examiner dismissed this as obvious in light of D1 and/or D2 without giving any detailed reasoning. This dismissal ignores the fact that to the extent that the structures of D1 and D2 have rectangular frame members, there

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/Cont'd...3

are only two such frame members. Thus the frame members cannot be arranged in an aligned row with a first predetermined spacing between each adjacent pair of frame members. The method of construction involving this step quite clearly simply did not occur to the inventors of either D1 or D2. The distinction has been emphasised in new Claim 10 by specifying that there are at least three frame members for which there is clear support in the Application as filed.

D1 and D2 also fail to disclose attaching horizontal runners with a second predetermined spacing between each adjacent pair of runners. Different spacings are provided between the "runners" of the structures of D1 and D2 as can be appreciated from the Figures of D1 and as is specifically stated in the quoted portion of D2.

Therefore, not only is there no disclosure of the steps of the method of Claim 10 in D1 and D2, there is also complete lack of suggestion of such steps. Accordingly, Claim 10 also defines subject matter which is novel and inventive in light of D1 and D2.

The description has been brought in line with the newly filed claims and D1 and D2 have been acknowledged therein. Reference numerals have been added throughout the claims. Finally, with reference to point 10 of the Written Opinion, it has been noted that drawing page 3 includes an error in the Figure show therein which should be identified as Fig. 5. We are also enclosing herewith, in triplicate, new drawings page 3 where the error has been corrected. We thank the Examiner for drawing it to our attention.

In light of the amendments made and the arguments put forward above it is hoped that a favourable International Preliminary Examination Report will now issue on this Application.

Please acknowledge receipt of this letter. An appropriate EPO Form 1037 is enclosed.

Yours faithfully,

A. FINDLAY  
(Professional Representative)  
LLOYD WISE, TREGEAR & CO.

enc.  
smb

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference AF-43886	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB99/00393	International filing date (day/month/year) 08/02/1999	Priority date (day/month/year) 09/02/1998
International Patent Classification (IPC) or national classification and IPC E04B1/348		
Applicant AYRSHIRE METAL PRODUCTS PLC et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 11 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 09/09/1999	Date of completion of this report 10.05.00
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Khera, D Telephone No. +49 89 2399 2529 



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/00393

**I. Basis of the report**

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

**Description, pages:**

1,8-12	as originally filed			
2-6,6a,7	as received on	08/03/2000	with letter of	03/03/2000

**Claims, No.:**

1-11	as received on	08/03/2000	with letter of	03/03/2000
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**Drawings, sheets:**

1/4,2/4,4/4	as originally filed			
3/4	as received on	08/03/2000	with letter of	03/03/2000

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/00393

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims 1-11
	No: Claims
Inventive step (IS)	Yes: Claims 1-11
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-11
	No: Claims

**2. Citations and explanations**

**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

**Re Item V:** Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The subject-matter of claim 1 relating to a building unit module is new since none of the documents cited in the search report discloses the combination of features as claimed.

Dependent claims 2 to 9 depend from claim 1 and thus likewise comprise novel subject-matter.

The subject-matter of independent claim 10 and dependent claim 11 relating to a method of constructing a building unit module is also not anticipated by the teachings of any of the documents mentioned in the search report and thus also satisfies the requirements of Article 33 (2) PCT.

2. The subject-matter of claim 1 comprises an inventive step (Article 33 (3) PCT):

Closest prior art is that disclosed in US-A-3 605 350 which discloses a building unit module corresponding to the first part of claim 1. This known structure is such that loads above the structure are transferred via the corner members. This makes the structure less suitable for stacking one on top of the other.

The object of the invention is to provide a structure wherein loads can be more uniformly distributed within the entire unit to thereby enable stacked units having improved structural characteristics. This is achieved by the characterising features of the claim and in particular by the use of a plurality of spaced rectangular frame members provided with longitudinal runners to form a lattice framework having internal sheeting and corner members as claimed.

There is no hint of such a structure, also not in GB-A-2 084 213 which similarly does not disclose a plurality of rectangular frame members arranged as claimed in claim 1.

Claims 2 to 9 depend from claim 1 and so also comprise inventive subject-matter.

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/GB99/00393

The subject-matter of independent method claim 10 relates to a method of erecting a structure which would have the features of the structure claimed in claim 1. There is no hint in the cited prior art of proceeding in the manner claimed, in particular, there is no hint of arranging three or more rectangular frame members as claimed.

Claim 11 is dependent from claim 10 and thus also comprises inventive subject-matter.

3. The subject-matter of claims 1 to 11 is suitable for industrial application.

**Re Item VII:** Certain defects in the international application

4. Reference to WP 2084213 in the description (page 3) should be corrected to GB-A-2 084 213.

construction material. Steel, while having a relatively high embodied energy content, is nevertheless a realistic incombustible structural alternative to wood. The use of steel also responds to the call by environmental organisations to minimise the use of wood in construction. Steel is 100% recyclable and has no material downgrading when recycled. There is little waste in its production and fabrication.

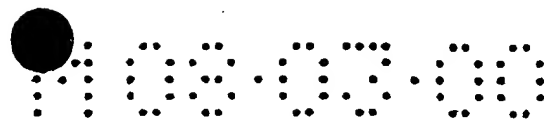
A further advantage of lightweight steel framing systems is that construction time can be reduced in comparison for example to constructions of brick and mortar. However on-site erection and interconnection of the panels is required and finishing of the building units including fitting of floor, roof and wall sheeting as well as decoration can only be done on site.

It is an object of the present invention to provide a unit module for a building which reduces the on-site construction time. It is a further object to provide such a unit which can be delivered to site in a fitted-out state.

It is a further object of the present invention to provide a building unit module which minimises the amount of steel required and is capable of fast construction whilst still being strong and robust.

It is a still further object of the present invention to provide a building unit module which can be formed at any desired length, width and height.

US Patent 3605350 describes a modular housing



structure which has an open-span interior, that is no interior load bearing walls. The structure comprises a base frame and a roof frame interconnected and spaced by corner posts. Two ends walls and side walls are formed from wooden studs with exterior sheeting.

WP Patent Application No. 2084213 describes a somewhat similar structure having a floor and a roof subframe connected together by vertical columns.

A building unit module comprising a lattice framework formed of a plurality of parallel rectangular frame members and multiple parallel runners connected to the frame members internally thereof, and sheeting attached to the runners to form an enclosure characterised in that the rectangular frame members are spaced along the length of the module, the runners each extending transversely along that length; in that the enclosure is defined exteriorally by the lattice framework, and in that the framework further comprises corner members extending lengthwise across the framework and connected to the frame members at the corners thereof.

The module is three-dimensional whereas the units of known lightweight steel framing systems are two-dimensional. This has a number of advantages. Firstly the amount of construction work on site is reduced as the need for erection and connection of individual panels of known lightweight steel framing systems is done away with. Furthermore the module can be fitted out off site

which allows production line techniques for fit-out and reduces the amount of materials and manpower required on site.

It has been found that the combination of the rectangular frame members, runners and sheeting produces a robust and strong structure more than capable of functioning as a room of a building. It is noted here that although the frame members are described as "rectangular", deviations from true rectangular shape are possible depending on desired room configuration.

The dimensions of the module can be simply varied by varying the number and/or dimensions of the frame members. This means that the module is very versatile and usable in a large number of different types of building.

In a preferred embodiment the frame members each comprise four interconnected frame sections. It is particularly preferred that the frame sections are joists of C-shaped cross-section and the runners are furring runners of "top hat" section.

In a first embodiment the frame members are formed first and the runners then connected thereto to provide the lattice framework. In an alternative embodiment, which is particularly suited for shipping overseas, spaced frame sections are interconnected by runners to form two panels and the ends of each frame section in one panel are connected to the ends of a frame section in the other panel by a pair of frame sections running

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transversely to the planes of the panels to provide the lattice framework.

The corner members may be angle members of structural steel and may be provided internally and externally of the framework.

The ends of the modules may be provided with plural parallel cross runners extending widthwise and connected to the end most frame members. The ends of the module can therefore be closed off by securing sheeting to the cross runners.

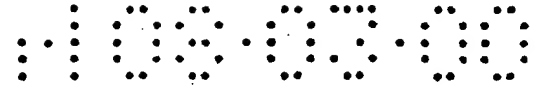
The cross runners may mount at least one window frame at one end of the module and a door at the other end of the module. Alternatively or additionally window frames may be mounted in the main runners as too may be door frames.

The cross runners may be provided in the form of two prefabricated panels which are then connected to the endmost frame members. Each panel is fitted with a door or window sub assembly as required.

Very preferably the lattice framework is formed of light gauge steel structural sections. Thus the advantages of steel as a construction material are employed in the module but the module is still relatively light. The use of lightweight steel allows the module to be transported via trailer to the proposed building site and manoeuvred into position simply and safely.

Plural modules may be used to form a building in which the modules are stacked one atop the other and/or



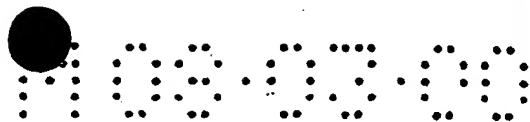


positioned side by side and interconnected by connecting the lattice framework of each module to the lattice framework(s) of the or each adjacent module(s).

The invention also provides a method of constructing a building comprising forming plural rectangular frame members, positioning the frame members vertically and in alignment, connecting multiple horizontal runners to the frame members with the horizontal runners parallel to each other to form a lattice framework, and, securing sheeting to the lattice framework via the runners so as to form an enclosure, characterised in that three or more rectangular frame members are formed which are positioned in an aligned row with a first predetermined spacing between each adjacent pair of frame members; in that the runners are connected to the frame members with a second predetermined spacing between each adjacent pair of runners, and in that the method further comprises, prior to securing the sheeting, securing horizontal angle members to the internal and/or external corners of the lattice framework.

The method, which provides a module of the first embodiment, preferably includes securing horizontal angle members to the four internal and four external corners of the lattice framework and carrying out the frame member formation step by interconnecting four structural sections.

The invention will now be further described by way of example with reference to the accompanying drawings in



6a

which:-

Figure 1 is a perspective view of a building unit module in accordance with the invention;

Figure 2 is a side view of the module of Figure 1;

Figures 3A and 3B are perspective views illustrating alternative constructions of frame members forming part of

the building unit module of Figure 1;

Figure 4 is an exploded perspective view illustrating a method of construction of the building unit module of Figure 1, and,

Figure 5 is a perspective view of three modules as shown in Figure 1 connected together in use.

The module shown in Figures 1 and 2 comprises a series of rectangular frame members 4 which are termed hereinafter "ribs". The ribs 4 are made from standard structural steel sections, preferably stud joist sections, welded together. The length of the four stud joist sections forming each rib 4 determines the cross-sectional dimensions of the module 2. The length of the module 2 is determined by the number of ribs 4 used.

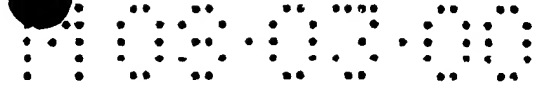


The ribs 4 are positioned vertically at a first predetermined spacing in two spaced jigs. Preferably one jig is fixed whilst the other is movable to accommodate ribs 4 of different width.

The ribs 4 are connected by a series of horizontally positioned runners 6 which run the full length of the module 2. The runners 6 are spaced at a second predetermined spacing and welded to the ribs 4 to create a lattice beam structure.

The ribs 4 are preferably constructed by welding four lightweight stud joist sections 5 together with two side frame sections 5a and a top and bottom frame section 5b. The stud joist sections employed may be of C-shaped cross-section with return flanges to give an overall open mouth box configuration. Other common sections can be used but preferred are the stud joist sections produced by the Applicants and described in their brochure Ayrshire Steel Framing. The preferred stud joist sections have cross-sectional dimensions ranging from 40 mm x 70 mm to 40 mm x 340 mm. The runners 6 are also preferably lightweight steel structural sections and most suitably top hat sections.

In the module of Figures 1 and 2 the stud joist sections 5 are arranged as illustrated in Figure 3A, with the side frame sections 5a oriented with their mouths outward. The top and bottom frame sections 5b are butt welded to the webs of the side frame sections 5a. The

CLAIMS

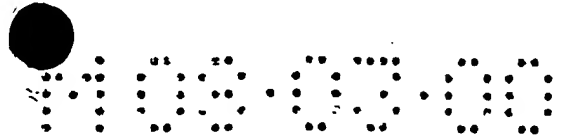
1. A building unit module (2) comprising a lattice framework formed of a plurality of parallel rectangular frame members (4) and multiple parallel runners (6) connected to the frame members (4) internally thereof, and sheeting attached to the runners (6) to form an enclosure characterised in that the rectangular frame members (4) are spaced along the length of the module, the runners (6) each extending transversely along that length; in that the enclosure is defined exteriorally by the lattice framework, and in that the framework further comprises corner members (10) extending lengthwise across the framework and connected to the frame members (4) at the corners thereof.

2. A building unit module as claimed in Claim 1 wherein the runners (6) are furring runners of top hat section.

3. A building unit module as claimed in either Claim 1 or Claim 2 wherein each frame member (4) comprises four interconnected frame sections (5).

4. A building unit module as claimed in Claim 3 wherein each frame member (4) comprises four welded joists (5) of C-shaped cross-section.

5. A building unit module as claimed in any preceding



Claim wherein the corner members are angle members (10).

6. A building unit module as claimed in any preceding Claim wherein the corner members (10) are provided both internally and externally of the framework.

7. A building unit module as claimed in any preceding Claim including plural parallel cross runners (18) extending widthwise and connected to the endmost frame members.

8. A building unit module as claimed in any preceding Claim wherein the lattice framework is formed of light gauge steel structural sections.

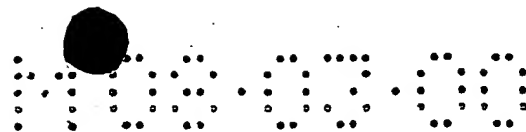
9. A building comprising a plurality of modules (2) as claimed in any preceding Claim stacked one atop the other and/or side by side and interconnected by connecting the lattice framework of each module (2) to the lattice framework(s) of the or each adjacent module(s) (2).

10. A method of constructing a building unit module comprising forming plural rectangular frame members (4), positioning the frame members (4) vertically and in alignment, connecting multiple horizontal runners (6) to the frame members (4) with the horizontal runners parallel to each other to form a lattice framework, and, securing sheeting to the lattice framework via the



runners so as to form an enclosure, characterised in that three or more rectangular frame members (4) are formed which are positioned in an aligned row with a first predetermined spacing between each adjacent pair of frame members (4); in that the runners (6) are connected to the frame members (4) with a second predetermined spacing between each adjacent pair of runners (6), and in that the method further comprises, prior to securing the sheeting (20, 22), securing horizontal angle members (10) to the internal and/or external corners of the lattice framework.

11. A method as claimed in Claim 10 wherein the frame member formation step is carried out by butt welding four structural sections (5) together.



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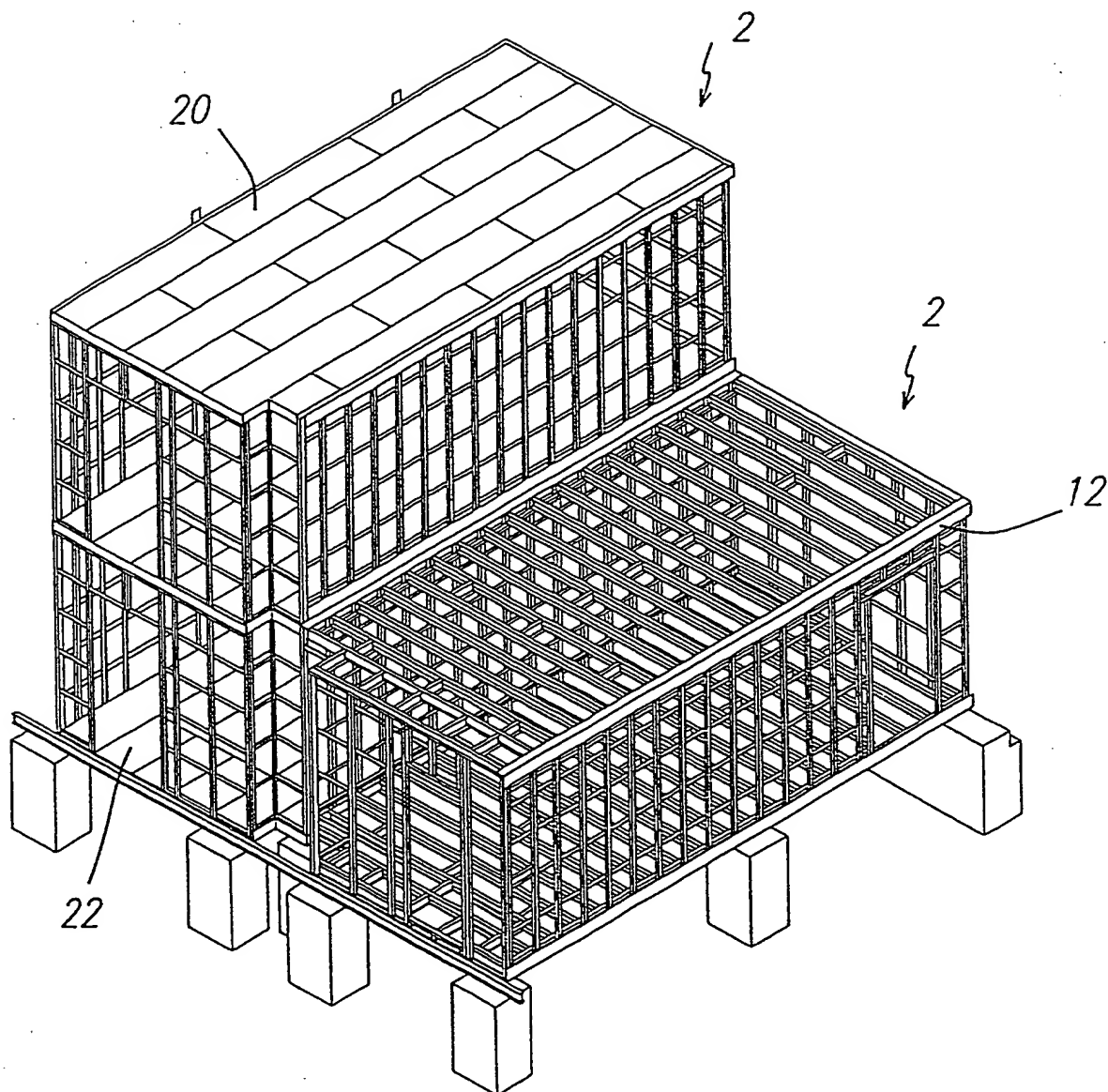


FIG 5

high embodied energy content, is nevertheless a realistic incombustible structural alternative to wood. The use of steel also responds to the call by environmental organisations to minimise the use of wood in construction. Steel is 100% recyclable and has no material downgrading when recycled. There is little waste in its production and fabrication.

A further advantage of lightweight steel framing systems is that construction time can be reduced in comparison for example to constructions of brick and mortar. However on-site erection and interconnection of the panels is required and finishing of the building units including fitting of floor, roof and wall sheeting as well as decoration can only be done on site.

It is an object of the present invention to provide a unit module for a building which reduces the on-site construction time. It is a further object to provide such a unit which can be delivered to site in a fitted-out state.

It is a further object of the present invention to provide a building unit module which minimises the amount of steel required and is capable of fast construction whilst still being strong and robust.

It is a still further object of the present invention to provide a building unit module which can be formed at any desired length, width and height.

A building unit module in accordance with the invention comprises a lattice framework formed of a plurality of parallel spaced rectangular frame members and



multiple parallel runners each extending transversely and connected to at least two adjacent frame members, and, sheeting attached to the runners to form an enclosure defined exteriorly by the lattice framework.

The module is three-dimensional whereas the units of known lightweight steel framing systems are two-dimensional. This has a number of advantages. Firstly the amount of construction work on site is reduced as the need for erection and connection of individual panels of known lightweight steel framing systems is done away with. Furthermore the module can be fitted out off site which allows production line techniques for fit-out and reduces the amount of materials and manpower required on site.

It has been found that the combination of the rectangular frame members, runners and sheeting produces a robust and strong structure more than capable of functioning as a room of a building. It is noted here that although the frame members are described as "rectangular", deviations from true rectangular shape are possible depending on desired room configuration.

The dimensions of the module can be simply varied by varying the number and/or dimensions of the frame members. This means that the module is very versatile and usable in a large number of different types of building.

In a preferred embodiment the frame members are spaced along the length of the module and the runners extend along that length. The frame members each comprise four interconnected frame sections. It is

particularly preferred that the frame sections are joists of C-shaped cross-section and the runners are furring runners of "top hat" section.

In a first embodiment the frame members are formed first and the runners then connected thereto to provide the lattice framework. In an alternative embodiment, which is particularly suited for shipping overseas, spaced frame sections are interconnected by runners to form two panels and the ends of each frame section in one panel are connected to the ends of a frame section in the other panel by a pair of frame sections running transversely to the planes of the panels to provide the lattice framework.

The lattice framework may include a corner member connected between each of the adjacent corners of at least two adjacent frame members. Preferably however each corner member extends across and is connected to all the frame members at corresponding corners thereof. The corner members may be angle members of structural steel and may be provided internally and externally of the framework.

The ends of the modules may be provided with plural parallel cross runners extending widthwise and connected to the end most frame members. The ends of the module can therefore be closed off by securing sheeting to the cross runners.

The cross runners may mount at least one window frame at one end of the module and a door at the other end of the module. Alternatively or additionally window frames

may be mounted in the main runners as too may be door frames.

The cross runners may be provided in the form of two prefabricated panels which are then connected to the endmost frame members. Each panel is fitted with a door or window sub assembly as required.

Very preferably the lattice framework is formed of light gauge steel structural sections. Thus the advantages of steel as a construction material are employed in the module but the module is still relatively light. The use of lightweight steel allows the module to be transported via trailer to the proposed building site and manoeuvred into position simply and safely.

Plural modules may be used to form a building in which the modules are stacked one atop the other and/or positioned side by side and interconnected by connecting the lattice framework of each module to the lattice framework(s) of the or each adjacent module(s).

The invention also provides a method of constructing a building unit module comprising forming plural rectangular frame members, positioning the frame members vertically in an aligned row with a first predetermined spacing between each adjacent pair of frame members, connecting multiple horizontal runners to the frame members with the horizontal runners parallel to each other and with a second predetermined spacing between each adjacent pair of runners to form a lattice framework, and, securing sheeting to the lattice framework via the runners

to form an enclosure.

The method, which provides a module of the first embodiment, preferably includes securing horizontal angle members to the four internal and four external corners of the lattice framework and carrying out the frame member formation step by interconnecting four structural sections.

The invention will now be further described by way of example with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a building unit module in accordance with the invention;

Figure 2 is a side view of the module of Figure 1;

Figures 3A and 3B are perspective views illustrating alternative constructions of frame members forming part of the building unit module of Figure 1;

Figure 4 is an exploded perspective view illustrating a method of construction of the building unit module of Figure 1, and,

Figure 5 is a perspective view of three modules as shown in Figure 1 connected together in use.

The module shown in Figures 1 and 2 comprises a series of rectangular frame members 4 which are termed hereinafter "ribs". The ribs 4 are made from standard structural steel sections, preferably stud joist sections, welded together. The length of the four stud joist sections forming each rib 4 determines the cross-sectional dimensions of the module 2. The length of the module 2 is

determined by the number of ribs 4 used.

The ribs 4 are positioned vertically at a first predetermined spacing in two spaced jigs. Preferably one jig is fixed whilst the other is movable to accommodate ribs 4 of different width.

The ribs 4 are connected by a series of horizontally positioned runners 6 which run the full length of the module 2. The runners 6 are spaced at a second predetermined spacing and welded to the ribs 4 to create a lattice beam structure.

The ribs 4 are preferably constructed by welding four lightweight stud joist sections 5 together with two side frame sections 5a and a top and bottom frame section 5b. The stud joist sections employed may be of C-shaped cross-section with return flanges to give an overall open mouth box configuration. Other common sections can be used but preferred are the stud joist sections produced by the Applicants and described in their brochure Ayrshire Steel Framing. The preferred stud joist sections have cross-sectional dimensions ranging from 40 mm x 70 mm to 40 mm x 340 mm. The runners 6 are also preferably lightweight steel structural sections and most suitably top hat sections.

In the module of Figures 1 and 2 the stud joist sections 5 are arranged as illustrated in Figure 3A, with the side frame sections 5a oriented with their mouths outward. The top and bottom frame sections 5b are butt welded to the webs of the side frame sections 5a. The

CLAIMS

1. A building unit module comprising a lattice framework formed of a plurality of parallel spaced rectangular frame members and multiple parallel runners each extending transversely and connected to at least two adjacent frame members, and, sheeting attached to the runners to form an enclosure defined exteriorly by the lattice framework.

2. A building unit module as claimed in Claim 1 wherein the frame members are spaced along the length of the module and the runners extend along that length.

3. A building unit module as claimed in either Claim 1 or Claim 2 wherein the runners are furring runners of top hat section.

4. A building unit module as claimed in any preceding Claim wherein each frame member comprises four interconnected frame sections.

5. A building unit module as claimed in Claim 4 wherein each frame member comprises four welded joists of C-shaped cross-section.

6. A building unit module as claimed in any preceding Claim wherein the lattice framework includes a corner

member connected between each of the adjacent corners of at least two adjacent frame members.

7. A building unit module as claimed in Claim 6 wherein each corner member extends across and is connected to all the frame members at corresponding corners thereof.

8. A building unit module as claimed in either Claim 6 or Claim 7 wherein the corner members are angle members.

9. A building unit module as claimed in any one of Claims 6 to 8 wherein the corner members are provided both internally and externally of the framework.

10. A building unit module as claimed in any preceding Claim including plural parallel cross runners extending widthwise and connected to the endmost frame members.

11. A building unit module as claimed in any preceding Claim wherein the lattice framework is formed of light gauge steel structural sections.

12. A building comprising a plurality of modules as claimed in any preceding Claim stacked one atop the other and/or side by side and interconnected by connecting the lattice framework of each module to the lattice framework(s) of the or each adjacent module(s).

13. A method of constructing a building unit module comprising forming plural rectangular frame members, positioning the frame members vertically in an aligned row with a first predetermined spacing between each adjacent pair of frame members, connecting multiple horizontal runners to the frame members with the horizontal runners parallel to each other and with a second predetermined spacing between each adjacent pair of runners to form a lattice framework, and, securing sheeting to the lattice framework via the runners as to form an enclosure.

14. A method as claimed in Claim 13 additionally comprising securing horizontal angle members to the internal corners of the lattice framework.

15. A method as claimed in either Claim 13 or Claim 14 additionally comprising securing horizontally angle members to the four external corners of the lattice framework.



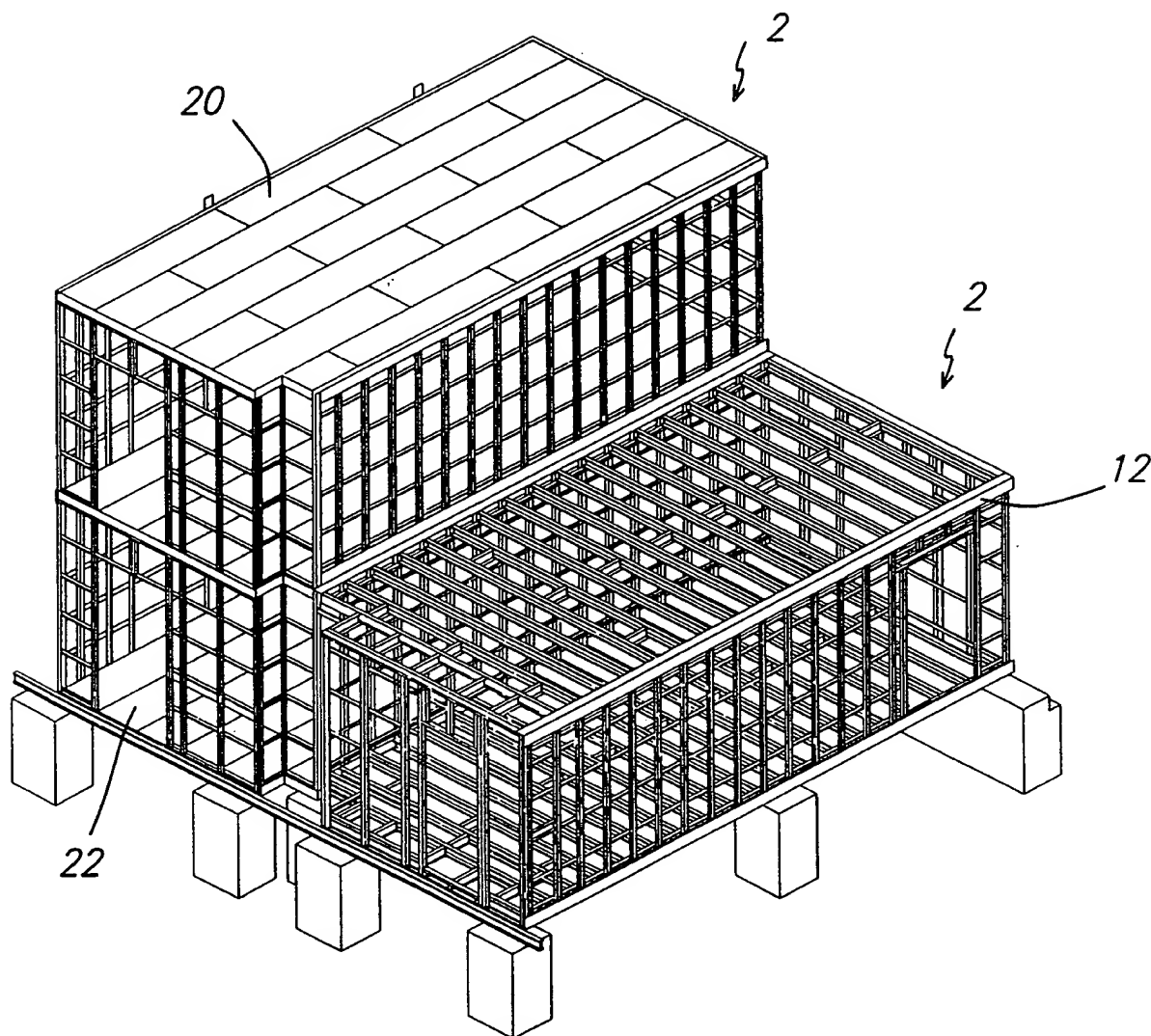


FIG 3

# ATTENT COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>WN/NV/XA1155</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 98/ 03832</b>	International filing date (day/month/year) <b>18/12/1998</b>	(Earliest) Priority Date (day/month/year) <b>19/12/1997</b>
Applicant  <b>BRITISH AEROSPACE PUBLIC LIMITED COMPANY et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

### 1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

2

☐ None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

T/GB 98/03832

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 G06K9/64 G06F15/80

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 G06K G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 630 021 A (LI ZHI-JIAN ET AL) 13 May 1997 see column 2, line 1 - line 67 ---	1-8
A	VAN DE PANNE M ET AL: "MACHAM: A BEST MATCH CONTENT ADDRESSABLE MEMORY" PROCEEDINGS OF THE PACIFIC RIM CONFERENCE ON COMMUNICATIONS, COMPUTERS AND SIGNAL PROCESSING, VICTORIA, JUNE 1 - 2, 1989, 1 June 1989, pages 612-615, XP000077554 INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS see page 612, left-hand column, line 1 - page 614, left-hand column, line 22; figures 1-6 --- -/--	1-7

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

27 April 1999

Date of mailing of the international search report

12/05/1999

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Schenkels, P

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 98/03832

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 487 133 A (PARK CHIN S ET AL) 23 January 1996 see abstract see column 3, line 66 - column 4, line 37 see column 25, line 16 - column 26, line 21; figures 27,28 ---	1-8
A	CHENG-AN HUNG ET AL: "A match-based clustering neural network for stable category learning of multiple-valued patterns" JOURNAL OF INFORMATION SCIENCE AND ENGINEERING, DEC. 1997, INST. INF. SCI., ACAD. SINICA, TAIWAN, vol. 13, no. 4, pages 543-562, XP002101325 ISSN 1016-2364 see page 543, line 1 - page 548, line 7; figure 1 ---	8
A	EP 0 694 855 A (IBM ;PAILLET GUY (FR)) 31 January 1996 see abstract see page 6, line 2 - line 51 -----	1-7

# INTERNATIONAL SEARCH REPORT

ation on patent family members

International Application No

T/GB 98/03832

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5630021	A	13-05-1997	NONE		
US 5487133	A	23-01-1996	NONE		
EP 0694855	A	31-01-1996	JP	8171541 A	02-07-1996
			US	5740326 A	14-04-1998

CLAIMS

1. A building unit module (2) comprising a lattice framework formed of a plurality of parallel rectangular frame members (4) and multiple parallel runners (6) connected to the frame members (4) internally thereof, and sheeting attached to the runners (6) to form an enclosure characterised in that the rectangular frame members (4) are spaced along the length of the module, the runners (6) each extending transversely along that length; in that the enclosure is defined exteriorally by the lattice framework, and in that the framework further comprises corner members (10) extending lengthwise across the framework and connected to the frame members (4) at the corners thereof.

2. A building unit module as claimed in Claim 1 wherein the runners (6) are furring runners of top hat section.

3. A building unit module as claimed in Claim 1 wherein each frame member (4) comprises four interconnected frame sections (5).

4. A building unit module as claimed in Claim 3 wherein each frame member (4) comprises four welded joists (5) of C-shaped cross-section.

5. A building unit module as claimed in Claim 1 wherein the corner members are angle members (10).

6. A building unit module as claimed in Claim 1 wherein the corner members (10) are provided both internally and externally of the framework.

7. A building unit module as claimed in Claim 1 including plural parallel cross runners (18) extending widthwise and connected to the endmost frame members.

8. A building unit module as claimed in Claim 1 wherein the lattice framework is formed of light gauge steel structural sections.

9. A building comprising a plurality of modules (2) as claimed in Claim 1 stacked one atop the other and/or side by side and interconnected by connecting the lattice framework of each module (2) to the lattice framework(s) of the or each adjacent module(s) (2).

10. A method of constructing a building unit module comprising forming plural rectangular frame members (4), positioning the frame members (4) vertically and in alignment, connecting multiple horizontal runners (6) to the frame members (4) with the horizontal runners parallel to each other to form a lattice framework, and, securing sheeting to the lattice framework via the

runners so as to form an enclosure, characterised in that three or more rectangular frame members (4) are formed which are positioned in an aligned row with a first predetermined spacing between each adjacent pair of frame members (4); in that the runners (6) are connected to the frame members (4) with a second predetermined spacing between each adjacent pair of runners (6), and in that the method further comprises, prior to securing the sheeting (20, 22), securing horizontal angle members (10) to the internal and/or external corners of the lattice framework.

11. A method as claimed in Claim 10 wherein the frame member formation step is carried out by butt welding four structural sections (5) together.